What is claimed is:

1. A lithium battery comprising:

a cathode;

an anode; and

a separator interposed between the cathode and the anode, wherein an inorganic protective film is formed on at least one surface of the separator.

2. The lithium battery of claim 1, wherein the inorganic protective film is single-ion conducting glass having lithium-ion conductivity.

3. The lithium battery of claim 1, wherein the inorganic protective film is at least one selected from the group consisting of lithium nitride, lithium silicate, lithium borate, lithium aluminate, lithium phosphate, lithium phosphorus oxynitride, lithium silicosulfide, lithium germanosulfide, lithium lanthanum oxide, lithium titanium oxide, lithium borosulfide, lithium aluminosulfide, lithium phosphosulfide, and mixtures thereof.

4. The lithium battery of claim 1, wherein the inorganic protective film has a thickness of 0.01 to 5 ㎛.

5. The lithium battery of claim 1, wherein the inorganic protective film is formed by gas reaction, thermal deposition, sputtering, chemical vapor deposition, plasma enhanced chemical vapor deposition, laser enhanced chemical vapor deposition, ion plating, cathodic arc, jet vapor deposition or laser ablation.

6. The lithium battery of claim 1, wherein the separator is a polyethylene separator, a polypropylene separator, a polyethylene/polypropylene double-layered separator, a polyethylene/polypropylene/polyethylene triple-layered separator, a polypropylene/polyethylene/polypropylene triple-layered separator, glass fiber filter paper, or a ceramic separator.

7. A method of forming an inorganic protective film of a separator comprising:

depositing a lithium metal on the separator; and

contacting the separator having the lithium metal deposited thereon with N_2, SO_2, CO_2 or O_2 to form the inorganic protective film.

8. The method of claim 7, wherein the inorganic protective film is single-ion conducting glass having lithium-ion conductivity.

9. The method of claim 7, wherein the inorganic protective film is at least one selected from the group consisting of lithium nitride, lithium silicate, lithium borate, lithium aluminate, lithium phosphate, lithium phosphorus oxynitride, lithium silicosulfide, lithium germanosulfide, lithium lanthanum oxide, lithium titanium oxide, lithium borosulfide, lithium aluminosulfide, lithium phosphosulfide, and mixtures thereof.

10. The method of claim 7, wherein the inorganic protective film has a thickness of 0.01 to 5 μm.

11. The method of claim 7, wherein the separator is a polyethylene separator, a polypropylene separator, a polyethylene/polypropylene double-layered separator, a polyethylene/polypropylene/polyethylene triple-layered separator, a polypropylene/polyethylene/polypropylene triple-layered separator, glass fiber filter paper, or ceramic separator.